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Mesquite Control on Southwestern Rangeland

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MESQUITE CONTROL ON SOUTHWESTERN RANGELAND

By **H. G. Reynolds and F. H. Tschirley**

Many ranchers can benefit by controlling mesquite on their rangeland. Nearly 70 million acres in Texas, southern New Mexico, Arizona, and southwestern California are now occupied by mesquite. This area is nearly twice that occupied 50 years ago.

When mesquite takes over, forage production declines (fig. 1). Although mesquite leaves and beans replace some of the forage formerly furnished by perennial grass, mesquite forage does not compensate for the grass it crowds out. For example, when mesquite completely suppresses perennial grass, forage production is reduced to less than one-third of capacity.

Proper grazing alone will not contain mesquite, because grazing animals are partly responsible for the increase. Livestock eagerly eat mesquite beans, even when perennial grass is available. Eighty to 90 percent of the mesquite seeds can ger-

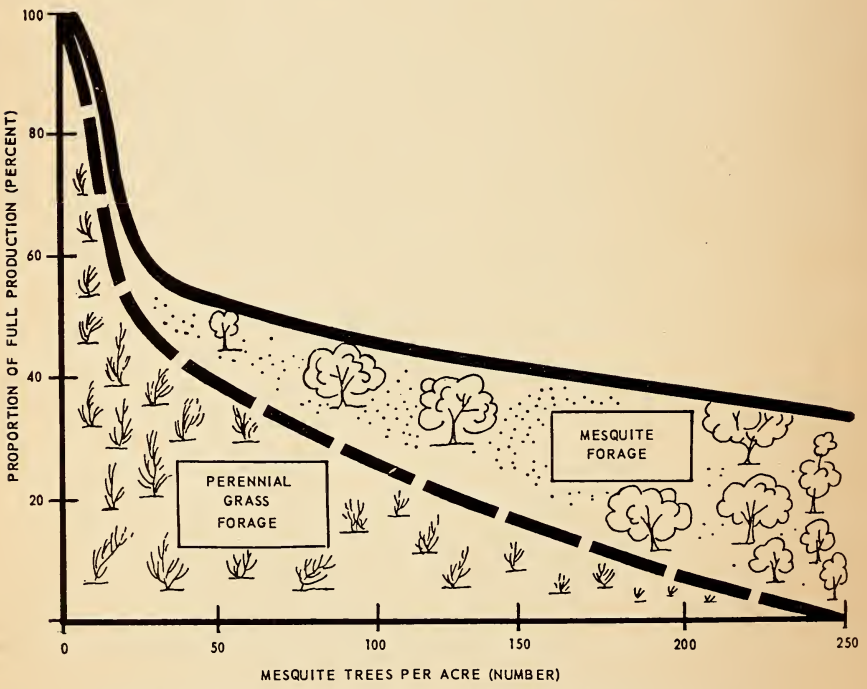

FIGURE 1.—Relation of mesquite abundance to forage production.

minate after passing through the animals. Thus, wandering livestock spread seeds over wide areas. A dense perennial grass cover will retard but not prevent the establishment of mesquite seedlings. Without adequate control measures to kill seedlings that do become established, mesquite can gradually take over grasslands.

In dense stands of mesquite, the capacity of the soil to absorb rainfall is lower than under grass cover. Thus, mesquite invasion is accompanied by increased surface runoff and greater erosion. Dense stands of mesquite also make the handling of livestock more difficult and increase screwworm infection.

Mesquite control [1] can be a sound investment in rangeland improvement. Control in the early stages of invasion is cheapest. Greatest opportunities for restoring grass are in formerly highly productive grassland areas. Where rainfall is low, mesquite control may not be advisable, since only sparse stands of grass can be produced. Areas selected for mesquite control should have good soil and relatively high rainfall. A remnant stand of perennial grass is also desirable; otherwise reseeding will be necessary.

REMOVAL BY GRUBBING

If the soil is free of large rocks, mesquite smaller than 1 inch in diameter at the ground level can be grubbed with a mattock or hoe. Root crowns, which usually lie 5 to 6 inches below the soil surface, must be removed to kill the plants. Grubbing is especially useful in the early stages of mesquite invasion and for obtaining more complete control in combination with spraying or cabling. Grubbing is effective during any season of the year.

APPLYING CHEMICALS TO STEM BASES

Low-grade diesel oil, when applied to the base of individual trees, chemically girdles the stem and kills dormant buds at the root-stem transition zone (fig. 2, *A*). Oil must be applied completely around the lower 6 to 8 inches of stem, since dormant buds are killed only by direct contact with the fluid. Care should be taken to treat each stem in multiple-stemmed trees.

The amount of diesel oil necessary to kill all dormant buds depends upon the extent of the bud zone, the size and complexity of the tree, and the soil texture. (Use more oil on clays than sands.) Trees should be examined ocassionally to see that all buds at and below the soil line are being reached by oil. An average of 1 gallon of oil for five to seven trees is sufficient. A 2–4 gallon compressed-air sprayer operating under 10 to 20 pounds of pressure is best for this operation (fig. 2, *B*).

Many light petroleum oils are toxic enough to kill mesquite, but diesel oil is best. One-half pint of diesel oil fortified with a 1 percent solution of ethylenedibromide or an ester of 2,4,5-T for each tree gives satisfactory kills, but costs equal or exceed those of treatment with diesel oil alone.

Single stem treatment with oil should replace grubbing when trees are larger than 1 inch in diameter. Oiling becomes too costly, however, beyond about 100 trees per acre. Oil can be applied anytime during the year.

Monuron and fenuron are somewhat promising for basally treating individual stems of mesquite. At present, use of these chemicals is

[1] Treatments for specific varieties of mesquite and local areas (e.g., honey mesquite in New Mexico and Texas) may differ somewhat from general recommendations given here. Ranchers should check with local agricultural authorities before undertaking mesquite control.

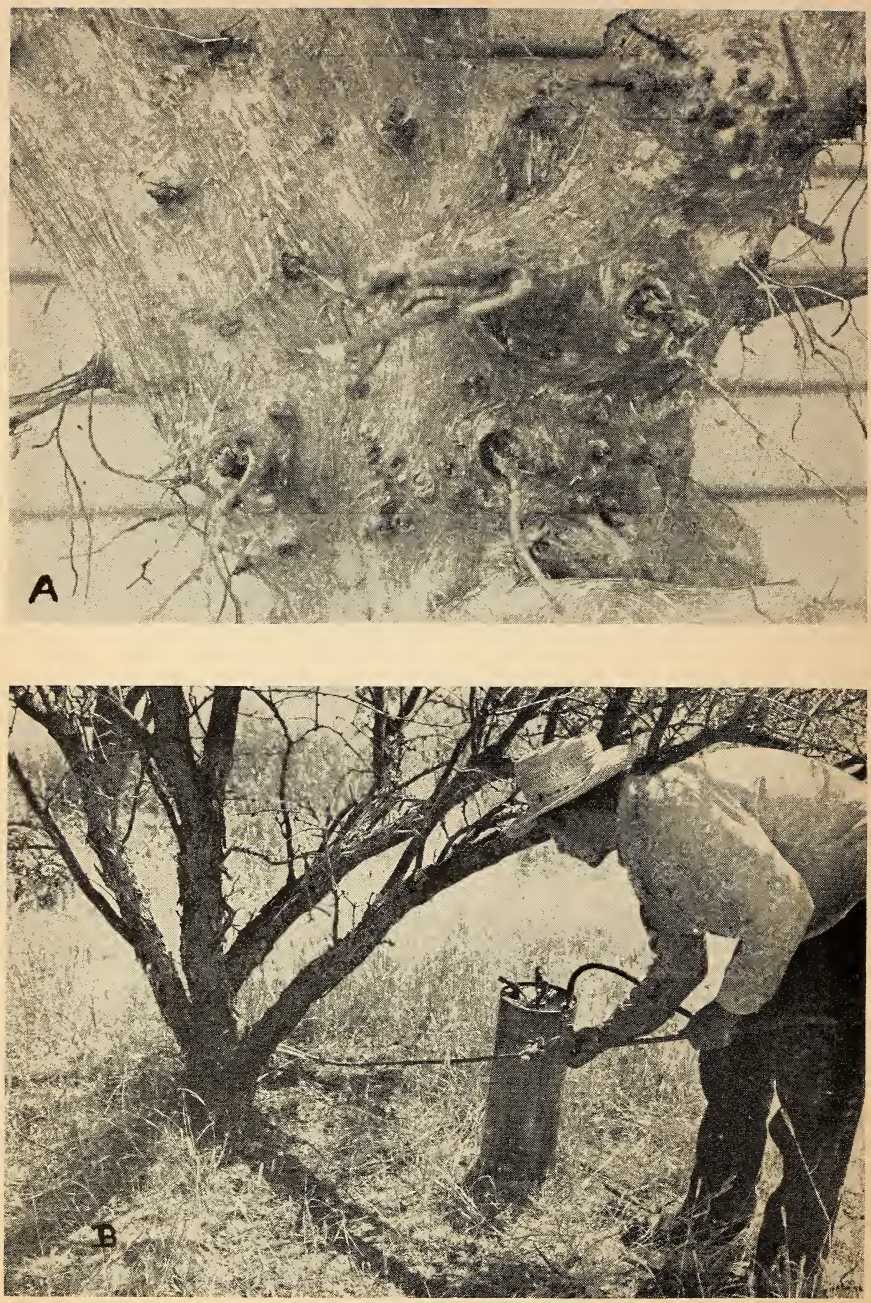

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FIGURE 2.—Single stem, chemical treatment: *A*, Dormant buds are numerous in the root-stem transition zone of mesquite trees. Oil is applied to kill these buds and to chemically girdle the tree; *B*, a 2–4 gallon compressed-air sprayer equipped with a 3-foot piece of ¼-inch copper tubing is a good device for applying the oil.

more expensive, and gives less consistent kills than diesel oil.

Mesquite can also be killed with sodium arsenite, but since this chemical is extremely poisonous to humans and livestock, its use is no longer recommended.

CLEARING WITH MECHANICAL EQUIPMENT

Sites for chaining or cabling should be selected carefully. Trees should be larger than 3 inches in stem diameter; stands should be mostly even aged and dense (more than 100 trees per acre); soil should be moist; and topography should be fairly level. A chain or cable 300 to 500 feet long should be dragged between two heavy, crawler-type tractors (each with 155-hp. drawbar pull or the equivalent) twice over the area in opposite directions. The tractors should be driven parallel to each other as fast as possible (fig. 3, *A*). They should be handled carefully to reduce disturbance of soil and grass. For cabling, a woven, multistrand, steel wire cable about 1¾ inches in diameter should be used. An anchor chain weighing 30 pounds a link is equally effective (fig. 3, *B*). Bulldozing of individual trees in light stands is highly effective, but it is slightly more expensive than diesel oiling.

SPRAYING FOLIAGE BY AIRPLANE

In dense stands, especially where the topography is rough, mesquite is best controlled by aerial applica-

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FIGURE 3.—Mass treatment of heavy stands: *A*, Cabling or chaining works well with trees larger than 3 inches, and large crawler tractors can travel easily; *B*, dragging a heavy anchor chain (30 pounds per link) effectively uproots mesquite.

tion of herbicides. Under ideal conditions, spraying top-kills more than 90 percent of the mesquite and totally kills up to 50 percent of the stand.

The most effective formulation for mesquite in southern Arizona and New Mexico is ⅓ to ½ pound acid equivalent per acre of a low-volatile ester of 2,4, 5-T in ½ gallon of diesel oil emulsified in enough water to make 4 gallons of solution. Agitation of spray mixture is essential. Two applications are necessary, 1 or 2 years apart, depending on effectiveness of the first treatment.

The proper time for spraying is between April 15 and July 15. Within these 3 months, there is a 10- to 25-day period when mesquite is most susceptible to foliage sprays. Spraying is most effective when leaves are full-size, terminal elongation has stopped, and developing pods are about ½ inch long (fig. 4).

When spraying mesquite by airplane, the pilot should observe safety rules on weather, terrain, and equipment. Also, he should make sure that the spray cannot drift to cotton fields, garden plants, or other highly susceptible crops.

PLANNING FOR CONTROL

In selecting the proper control method for mesquite, several factors must be considered: (1) The degree and location of the invasion, (2) age classes of trees in the stand, (3) proper season for treatment, (4) availability of labor and equipment, (5) availability of funds, and (6) desirability of investment. Figure 5 can be used as a guide in selecting the method most appropriate for the particular stand of mesquite.

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FIGURE 4.—*A*, Foliage sprays are most conveniently and economically applied by an airplane; *B*, mesquite trees should be sprayed when leaves are full-size and developing pods are about ½ inch long.

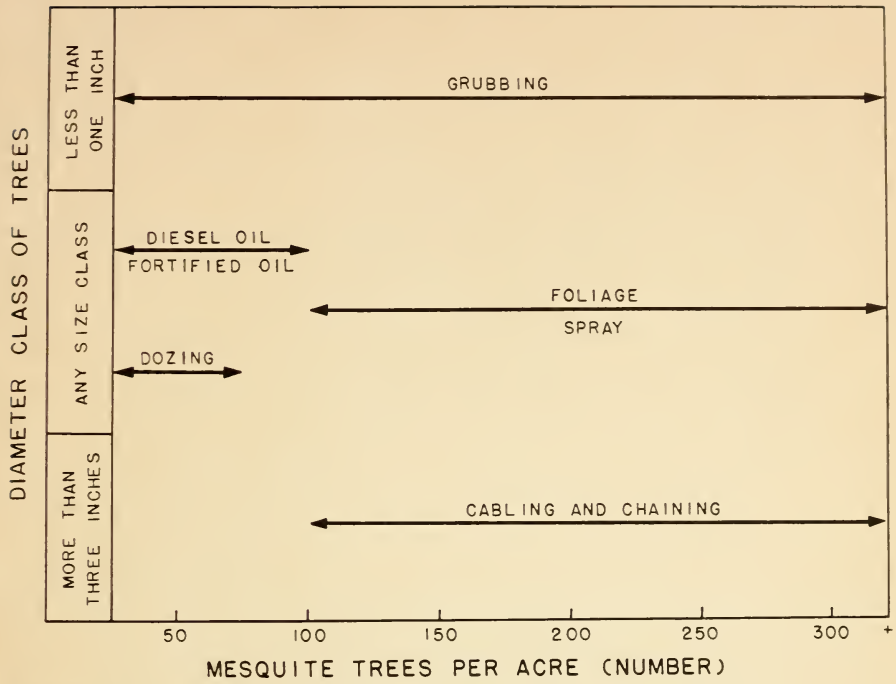

FIGURE 5.—Control methods to apply for various degrees of mesquite invasion.

Approximate costs for mesquite control can be estimated from the following figures:

Treatments	Costs per tree: Equipment and labor	Costs per tree: Chemical and materials	Costs per tree: Total
Grubbing	$0.015	----------	$0.015
Diesel oil	.035	$0.015	.05
	Costs per acre		
Cabling and chaining	4.00	----------	4.00
Foliage spraying (two treatments)	3.00	2.00	5.00

Under normal conditions, a two- to four-fold increase in grazing capacity can be expected. Each rancher must estimate his own net gain. On the Santa Rita Experimental Range, for example, original control costs have been paid in 5 to 10 years. The rate of return on investment depends on amount and composition of perennial grass remnant, whether reseeded, and rainfall conditions following treatment.

On a longtime basis, it is best to kill mesquite when it comes in. As mesquite is permitted to become more dense, forage production drops off, and eradication becomes more costly. Failure to act promptly means a greater control cost later.

BENEFITS OF CONTROL

Increase in forage is the greatest benefit from mesquite control. Moreover, these returns can be measured in terms of increased grazing capacity and greater sales of beef. With such data, accounting analyses will indicate the monetary benefits different individuals can obtain from the control of mesquite.

Other benefits, although they also may be real, are not so easy to put into monetary terms. Management of livestock is much easier and screwworm infection is lower on open grasslands than on brush-infested areas. Fewer deaths occur; weight gains are higher; and calf crops may be better under open conditions. A good cover of grass also helps control surface runoff and erosion. Under semiarid conditions, all available rainfall should be used. This is best accomplished by a grass cover that maintains an open, porous soil. To get full benefit from mesquite control, the rancher should also apply good grazing practices and proper management. Under suitable conditions, killing mesquite is one of the best longtime investments in rangeland improvement that he can make.

H. G. Reynolds is a wildlife research biologist with the Rocky Mountain Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture, with central headquarters maintained in cooperation with Colorado State University at Fort Collins, Colo. F. H. Tschirley is a range conservationist, Crops Protection Research Branch, Agricultural Research Service, U.S. Department of Agriculture, Tucson, Ariz. Most of the research was conducted on the Santa Rita Experimental Range about 35 miles south of Tucson, in cooperation with the University of Arizona and three range cattle operators.

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